

## ***Draft***

### ***TMT IN-Season Management Criteria – Objectives & Triggers***

**COE      April 19, 2000**

#### **Columbia and Snake River (System)**

##### ***Goals***

- Increase survival of listed fish populations by providing suitable migration conditions for all life phases of anadromous fish, while operating projects for multiple purposes.

##### ***Objectives***

- Meet BiOp objectives (including flow, spill, transportation, reservoir drafts limits, water quality, and FPP operation) and commitments per action agency's Records of Decision
- Meet tribal treaty and trust responsibilities
- Fulfill project operating requirements (flood control, navigation, irrigation, power generation, municipal & industrial water supply, recreation, fish & wildlife and water quality) , authorizations and contractual commitments

#### **Lower Columbia River**

##### **Goals**

- Increase survival of listed fish populations by providing suitable migration conditions for all life phases of anadromous fish, while operating projects for multiple purposes.

##### **Objectives**

- Provide a non-turbine passage route for juvenile migrants by providing spill at the lower Columbia River dams as permitted under state water quality standards as modified by variances, during the juvenile migration period which is approximately mid-April (20th) through August 31st with the exception of McNary Dam where the spill season ends June 30th.
- Collect and transport juvenile fish at McNary in the summer.
- Provide Lower Columbia river flow objectives as stated in the BiOps.

##### **Triggers**

- Initiation of spill: The date is near the historic migration time and juvenile fish numbers are in \_ digits and show an increasing trend for \_ consecutive days or are \_ digits for \_ days and do not decrease by more than \_% on the \_ day.

#### ***Bonneville***

##### **Objectives**

- Provide flows according to BiOp to protect Chum and Fall Chinook Spawning below Project, late October to April
- Spill to meet Spring Creek hatchery fish release needs.

### Triggers

- Fall-winter flows: dates of initiation of spawning and incubation of listed chum and fall chinook; dependent on flow conditions

### ***The Dalles***

### Objectives

### Triggers

### ***John Day***

### Objectives

- Operate within a 1.5 feet of 262.5 feet from April 20 to September 30, or as coordinated with reservoir users and TMT.
- Maintain Irrigation

### Triggers

### ***McNary***

### Objectives

- Transport Juvenile Fish in the summer
- 220 – 260 kcfs Flow Objective from April 20 to June 30
- 200 kcfs Flow Objective from July 1 to August 31
- Montana feels that this should be based on water availability in upstream subbasins

### Triggers

- Flow forecast
- Begin transport when: (1) subyearling chinook predominate total chinook daily collections for 3 consecutive days and (2) in-river conditions are no longer “spring like”.

## **Middle Columbia River**

### ***Over all***

### Goals

- Assure reservoirs are as full as possible (Montana says use VARQ Flood Control) at the start of the migration periods so natural runoff is used to increase river flows instead of filling empty reservoir space. Draft reservoirs as needed during the spring migration period to achieve flow objectives but place a higher priority on achieving reservoir refill by July 1 than meeting spring flow levels.
- Montana says use a parabolic reservoir refill trajectory at storage reservoirs (i.e. as the pool approaches full, gradually reduce the refill rate) and attempt to fill on the date that inflows decline to turbine capacity (this reduces the chance of a forced spill/gas supersaturation). Use available pass-through flow during the spring migration period to achieve flow objectives

- Coordinate federal and PUD project operations to provide suitable discharge from Grand Coulee and Chief Joseph projects to enable Priest Rapids Dam operations to minimize river fluctuations and stranding of juvenile chinook salmon in the Hanford reach.

## Objectives

- Vernita Bar spawning and incubation.

## Triggers

- Establish and maintain fall chinook incubation flows according to 1988 VB Settlement Agreement.
- Montana says monthly reservoir inflow forecasts define VARQ flood vacancy requirements and refill trajectory.

## ***Priest Rapids***

## Objectives

- 135 kcfs Flow Objective from April 10th - June 30
- Implement Hanford Reach Stranding agreement
- *Maintain a steady or increasing hydrograph through the spring to the extent possible to protect emergent fry in the Hanford reach.*

## Triggers

- *Index seining in the Hanford Reach captures 50 or more sub-yearling chinook from the 6 index seine sets.*

## ***Chief Joseph***

## Objectives

- Operate at elevation 930 – 956 feet from October 21 to February 14
- Operate at a lower limit of 950 feet from February 15 to May 15 for Goose nesting.
- Operate at elevation 950 – 956 feet from May 16 to October 20

## Triggers

## ***Grand Coulee***

## Objectives

- Assist in Meeting BiOp in-season flow objectives (April 10 to August 31). Montana adds by re-regulating upstream runoff to create a protracted runoff event.
- Operate to meet 85% confidence level of meeting April 10.
- Assist in meeting chum flows October-April
- Serve irrigation diversion requirements
- Prevent spill through SNL, or by banking the water; Spill with minimum TDG impact
- Provide flows for Vernita Bar; and to help alleviate Hanford stranding
- Draft/fill for power or non-power emergencies; Maintain power system integrity
- Meet multi-purpose needs: tribal needs (e.g., 1283 feet), power, NWPPC-resident fish, minimum lake level for ferry operation, etc.
- Refill by June 30. Provide for safe recreation from July 4 through Labor Day.
- Secure optimum period-by-period storage levels to be responsive to needs and emergencies
- Minimum 1225 feet FDR Lake level to maintain ferry operation

- Sufficient water releases to protect such needs as navigation (e.g., reactor vessels, etc)
- Maintain kokanee spawning habitat and production.
- Maintain zooplankton productivity in the lake.
- Maintain macrophyte productivity in the lake.
- Avoid exposure of areas that contain deposits of toxic materials during the peak summer recreation season.
- Maintain access to marinas and boat ramps during the summer recreation season.
- Maintain safe recreation conditions.
- Minimize exposure of cultural resource sites during the summer recreation season.

## Triggers

- BiOp flow targets, dates, elevation limits (1280 feet), fish curves
- Timing of flood control draft to minimize spill.
- Volume forecast
- Impending, perceived, or sudden emergencies – power or non-power
- Project operating requirements – daily draft or refill rate limits to prevent bank sloughing
- Maintenance and other actions for dam safety, public safety
- 1240 feet or other elevations for efficient pumping to keep up with irrigation demands
- Upstream (e.g., Canadian) operations
- Montana says inflows from upstream subbasins should define refill date and trajectory based on acceptable flood risk. After the threat of flooding is past and flows from headwaters subside, gradually release storage to extend the runoff event into summer.

## Upper Columbia

### ***Overall***

#### Goals

- The goal is to recover listed stocks of resident fish and assist in the recovery of listed anadromous salmonids in the Columbia River by providing the best possible flow conditions for resident fish while providing flow augmentation downstream for salmon. This will be achieved by providing the best utilization of Upper Columbia River basin resources to benefit resident and anadromous species, and improve conditions associated with the Clean Water Act, while recognizing trust responsibilities to Native American tribes."

#### Objectives

- Assist in meeting downstream BiOp flow objectives at Priest Rapids and McNary.
- Provide local and system flood control. (Montana wishes to provide flood control by using VARQ strategy at Hungry Horse and Libby)
- Meet other multi-purpose needs.

### ***Hungry Horse***

#### Goals

- Provide a suitable stream flow regime for bull trout and other sensitive native species in the Flathead Watershed.

#### Objectives

- Assist in meeting BiOp flow objectives.

- Operate to meet 75% confidence of refill by April 20th flood control.
- Provide local and system flood control.
- Meet minimum flow requirement of 3,500 cfs at Columbia Falls.
- Serve local and system-wide power or non-power emergency needs
- Avoid spill through such actions as deferring refill.
- Assist in meeting Flathead Basin Management operating objectives
- Secure optimum period-by-period storage levels to be responsive to needs and emergencies
- Minimized river fluctuations to protect resident fish.
- Montana's objectives
- Montana provides the following modified objectives. They want to meet the above objects by using the VARQ strategy instead of the way we operate today.
- Assist in meeting BiOp flow objectives by operating the reservoir above the IRCs, up to VARQ elevations (if safe in terms of flood control and economically feasible) to store water for spring release while maintaining 95% reservoir refill probability.
- Provide local and system flood control using VARQ strategy, then use improved reservoir refill potential to increase the number of years in which storage above elevation 3550 is available for summer flow augmentation. When available use storage above elevation 3550 for summer flow augmentation, gradually released to produce a smoothed discharge shape to benefit juvenile bull trout in the Flathead River downstream.
- Montana objects to the goal of operate to meet 75% confidence of refilling project by April 20th.
- Normalize reservoir discharge hydrograph. Smooth discharge especially during the biologically productive summer months to avoid flow fluctuations and attendant negative varial zone effects.

## Triggers

- Reservoir inflow forecasts
- Prognosis for spill; need for pre-emptive releases to avoid such spill
- Available turbine/generation capacity
- Expectations of flow arrival downstream for BiOp objectives triggers timing of release of storage draft.
- Refill date should be on or within a few days of the date on which inflows decline to within maximum turbine capacity.

## **Libby**

## Goals

- Restore natural recruitment to the Kootenai River white sturgeon population by providing suitable stream flows for spawning and recruitment.
- Provide a suitable stream flow regime for bull trout in the Kootenai and Flathead (Montana says only Kootenai) rivers.

## Objectives

- Assist in meeting BiOp flow objectives.
- Operate to meet 75% confidence of refill by April 20th flood control. Montana objects to this paragraph.
- On upper rule curves by April 10th (from ROD) Montana objects to this paragraph
- Provide local and system flood control.
- Meet International Joint Commission (IJC) requirements at Kootenay Lake
- Balance the needs of providing a volume water for sturgeon spawning, riverine habitat for bull trout, and achieving refill of Libby reservoir by mid-July.
- Provide suitable river flow and water temperature for sturgeon spawning, incubation, hatching, and juvenile survival.
- 15 kcfs flow at Bonners Ferry from May 1 to Start of Sturgeon Spawning
- Then release full powerhouse capacity for up to 42 days. Goal 35 kcfs at Bonners Ferry.

- Then 11 kcfs at Bonners ferry for 21 days.

## **Montana's Objectives**

- Montana provides the following modified objectives. They want to meet the above objects by using the VARQ strategy instead of the way we operate today.
- Assist in meeting BiOp flow objectives by operating the reservoir above the IRCs, up to VARQ elevations (if safe in terms of flood control and economically feasible) to store water for spring release while maintaining 95% reservoir refill probability.
- Use improved reservoir refill potential to increase the number of years in which storage above elevation 2449 is available for summer flow augmentation.
- Balance the needs of providing a volume water for sturgeon spawning, riverine habitat for bull trout, and achieving refill of Libby reservoir by mid-July. Refill date should be a sliding scale based on inflow volume, filling later in high water years.
- Provide local and system flood control using VARQ strategy.
- Normalize reservoir discharge hydrograph. Smooth discharge especially during the biologically productive summer months to avoid flow fluctuations and attendant negative varial zone effects.
- Use storage above elevation 2449 for summer flow augmentation, gradually released to produce a smoothed discharge shape to benefit juvenile white sturgeon and bull trout in the Kootenai River downstream.
- Maintain stable discharge from Libby Dam between the sturgeon spawning and salmon flow augmentation operations. This discharge may be between 4 kcfs and 10 kcfs.
- Ramp stream flows in the Kootenai River at a rate that does not strand or otherwise adversely impact bull trout. This ramp rate should not exceed a 10% change within a day or between days.
- Montana also submits the following guidelines for the Sturgeon Operation
- When low elevation runoff increases flows to 15 kcfs at Bonners Ferry, use Libby discharge as needed to maintain or increase flows (simulating a natural ascending limb of the runoff hydrograph) during the start of Sturgeon Spawning.
- Then release full powerhouse capacity for up to 42 days. Goal 35 kcfs at Bonners Ferry release Libby discharge as needed to meet the “tiered flow objective” at Bonners Ferry as described in the WS Recovery Plan and cited literature [Note: there seems to be some confusion about the operation specified by the WS Recovery Plan].
- Maintain stable discharge from Libby Dam between (Montana says after) the sturgeon spawning and salmon flow augmentation operations. This discharge may be between 4 kcfs and 10 kcfs.

## **Triggers**

- Reservoir inflow forecasts
- Refill date should occur on or within a few days of the date on which inflows decline to within turbine capacity.
- Initiation of sturgeon spawning.
- Guidelines developed by FWS for sturgeon and bull trout flows.
- Flow at Bonners Ferry
- Temperature at Bonners Ferry
- Local inflow to the Kootenai River between Libby Dam and Bonners Ferry is increasing or believed to be near the annual peak.

## **Albeni Falls**

### **Objectives**

- Operate to meet 90% confidence of refill by April 20th flood control.
- Meet Minimum Flow Requirements
- Provide local and system flood control.

## Triggers

- Reservoir inflow forecasts

## Lower Snake River

### ***Overall***

#### Goals

- Manage reservoirs to be as full as possible by the start of the migration season.
- Determine available water supply each migration year.
- Assure contracts are in place to provide 427 kaf from upper Snake River storage.
- Shift flood control releases to the maximum extent possible to benefit fish migration and shape flood control and spring runoff to the maximum extent possible into the juvenile migration season which begins early to mid April.
- Strive to ensure flows do not drop below 100 kcfs at Lower Granite during the spring migration season.
- Utilize in-season management, based on needs of the fish, to balance reservoir refill in June with helping maintain spring time flows at Lower Granite.
- Maximize juvenile spillway passage at lower Snake River dams by spilling to the full extent allowed by State standards during the spring migration period. Begin spill test for summer migrants.
- Operate turbines within 1% of peak efficiency March 15 through November 30.
- Maintain minimum operating pool elevations at all reservoirs on the lower Snake River from April 1 until juvenile numbers decrease to low numbers in the fall.
- Utilize a “spread the risk” transportation strategy based on annual pre-season projections of in-river migration conditions. Transport all fish collected from Snake River projects except those required for research.
- Control temperature and augment flow to the extent practicable during the fall chinook migration season.
- Utilize Brownlee reservoir to augment summer flow and shape BOR’s upper Snake River water to the maximum extent possible early in the summer season when Brownlee water temperatures are still cool and before lower Snake River water temperatures become critical..
- Utilize Dworshak as a source of augmentation water during the summer migration season to provide both temperature and flow benefits.
- Utilize Dworshak as a source of augmentation water during the summer *and fall* migration season to provide both temperature and flow benefits to listed juvenile *and adult salmon and steelhead*..
- Model temperature effects of using Dworshak and Brownlee reservoirs at defined outflows on defined dates and include these results in planning release schedules.
- Use results of temperature modeling and adult behavioral information to decide whether releases from Dworshak should occur during September to improve adult migration conditions.

#### Objectives

### ***Upper Snake(427 KAF)***

#### Objectives

- Secure annual volume on a willing buyer/seller basis, in compliance with Idaho State law
- Deliver available volumes into Brownlee in coordination with Idaho Power Company
- Achieve water quality objectives from volume deliveries

## Triggers

- BiOp flow targets, dates
- River flow limit (e.g., 1500 cfs at Milner, \_\_\_\_ cfs at Lime Point)
- Delivery is after flood control releases, typically late spring or in summer
- Consistent with Water Master scheduling
- Volumes delivered into Brownlee are summer/winter split per arrangements
- Shaping services from Brownlee delivers the full 427 KAF into Lower Granite in-season.
- Operating plans expressed by letter to the State of Idaho